AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A measuring apparatus for determining data relating to the shape of an input radiation wavefront, the wavefront shape being describable at a ~~particular~~ pre-determined location in an optical system, the apparatus comprising:

aberration means, the shape of which is defined by a ~~non-quadratic~~ filter function that is complex valued and has non-mixed symmetry;

detection means having a radiation sensitive surface capable of detecting the intensity of incident radiation on the surface, the detection means being coupled to an output device that provides a measure of the intensity of the incident radiation;

wherein the aberration means ~~acts on any~~ is configured to act on an input wavefront shape to produce first and second output radiation signals~~that in combination provide data from the output device on an extent to which the wavefront shape is non-planar~~.

2. (Currently Amended) A measuring apparatus as claimed in claim 1 wherein the aberrating means creates at least two ~~non-quadratic~~ filter functions, the filter functions being a complex conjugate pair.

3. (Canceled)

4. (Previously Presented) A measuring apparatus as claimed in claim 1 further including a wavefront modulator.

5. (Original) A measuring apparatus as claimed in claim 4 wherein the wavefront modulator is configured to transform a wavefront being describable by means of a complex function into a wavefront being describable by a real function.

6. (Previously Presented) A measuring apparatus as claimed in claim 1 wherein the output device is provided with the calculation means for calculating a difference between the first and second radiation signals.

7. (Previously Presented) A measuring apparatus as claimed in claim 1 wherein the radiation sensitive surface of the detection means is provided with elements that allow the measurement of radiation intensity at different points across the surface of the detection means.

8. (Original) A measuring apparatus as claimed in claim 6 wherein the output device is provided with the calculation means for calculating the difference between the first and second radiation signals at different points across the surface of the detection means.

9. (Previously Presented) A measuring apparatus as claimed in claim 4 wherein the wavefront modulator is coupled to the output device such that the wavefront modulator is distorted to provide a correction to a non-planar input radiation wavefront.

10. (Previously Presented) A measuring apparatus as claimed in claim 1 wherein the aberration function is a weighted sum of Zernike polynomials arranged to equalise the signal generated from each mode of deformation in the input wavefront according to the expected statistical distribution of such modes in the input wavefront.

11. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the aberration means is arranged such that the complex conjugate aberration functions of the aberration means are associated with diffraction orders of the same order but having different signs.

12. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the first and second output radiation signals are produced simultaneously.

13. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the first and second output radiation signals are produced sequentially.

14. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the aberration means is a diffractive optical element.

15. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the aberration means is a variable-shape optical mirror.

16. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the aberration means is a variable refractive index device.

17. (Original) A measuring apparatus as claimed in claim 16 wherein the variable refractive index device is a liquid crystal phase modulator used sequentially to provide complex conjugate aberrations.

18. (Previously Presented) A measuring apparatus as claimed in claim 2, wherein the aberration means is a deformed reflective surface where the illumination of that surface from each side produces the complex conjugate aberration functions.

19. (Currently Amended) A method for determining data relating to the shape of an input radiation wavefront, the wavefront shape being describable at a ~~particular~~ pre-determined location in an optical system, the method comprising:

transmitting said input radiation wavefront through an aberration means, the shape of which is defined by a ~~non-quadratic~~ filter function that is complex valued and has non-mixed symmetry;

detecting the intensity of incident radiation on a surface; and

sending the detected intensity to an output device that provides a measure of the intensity of the incident radiation;

wherein the aberration means acts on any input wavefront shape to produce first and second output radiation signals that in combination provide data from the output device ~~on the extent to which the wavefront shape is non-planar~~.

20-26. (Cancelled)

27. (Currently Amended) A measuring apparatus for determining data relating to the shape of an input radiation wavefront, the wavefront shape being describable at a ~~particular~~ pre-determined location in an optical system, the apparatus comprising:

aberration means, the shape of which is defined by a filter function that is complex valued and has non-mixed symmetry;

detection means having a radiation sensitive surface capable of detecting the intensity of incident radiation on the surface; and

an output device coupled to an output of the detection means;

wherein the aberration means ~~acts on any~~ is configured to act on an input wavefront shape to produce first and second output radiation signals that in combination produce an output signal from the output device ~~that indicates the extent to which the wavefront shape is non-planar, and wherein when the wavefront shape is planar, the output signal is substantially zero~~.

28. (Previously Presented) The measuring apparatus of claim 27, further comprising a wavefront modulator coupled to the output signal of the output device to modulate the input radiation wavefront in response thereto.

29. (New) A measuring apparatus as claimed in claim 27, wherein the output signal from the output device indicates an extent to which the wavefront shape is non-planar, and wherein when the wavefront shape is planar, the output signal is substantially zero.

30. (New) A measuring apparatus as claimed in claim 1, wherein the first and second output radiation signals, in combination, provide data from the output device on an extent to which the wavefront shape is non-planar.

31. (New) A measuring apparatus as claimed in claim 1 wherein the filter function is non-quadratic.

32. (New) A measuring apparatus for determining data relating to the shape of an input radiation wavefront, the wavefront shape being describable at a pre-determined location in an optical system, the apparatus comprising:

aberration means, the shape of which is defined by a filter function;

detection means having a radiation sensitive surface capable of detecting the intensity of incident radiation on the surface, the detection means being coupled to an output device that provides a measure of the intensity of the incident radiation;

wherein the aberration means is configured to act on an input wavefront to produce first and second output radiation signals, and

wherein the filter function comprises a real part and an imaginary part, the real and imaginary parts both having even symmetry or both having odd symmetry.

33. (New) A measuring apparatus as claimed in claim 32 wherein the filter function is complex valued and has non-mixed symmetry.